Welch Allyn®
Kreativ®

Mach 7/8

Air Abrasion System

User's Guide

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CAUTION: This device must only be purchased by, or sold to, a licensed dentist. Clinical use of the Mach 7/8 Air Abrasion system for procedures not included or suggested in this guide is not advised. The Mach 7/8 Air Abrasion system should only be used by dental professionals who have practiced on extracted teeth and are thoroughly familiar with the contents of this manual.

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1. Safety

Warnings

The dentist, staff, and patient should always wear *protective eye equipment* to avoid corneal abrasion or irritation if particles are deflected into the eye.

A *rubber dam* is recommended to avoid injury to gingiva or other soft tissue, and to protect adjacent tooth surfaces during interproximal preparations.

Never direct the *handpiece* at an open pulp chamber or at pulpal exposures. Never place the handpiece in direct contact with the gingiva when the air pressure is activated. While the abrasive stream may not cut the gingival tissue, it may irritate it.

Sterilize all Mach 7/8 accessories that come in contact with the patient prior to each use.

The *handpiece must never be directed at soft tissues*, even for a brief period of time, because subcutaneous emphysema can occur whenever compressed air is employed intraorally.

Never rest the handpiece on the patient's body.

Always *disinfect the handpiece* cradle in the unit before each patient use.

Always use your *high volume evacuation* system when using the handpiece of the Mach 7/8. Place the high volume evacuation system in close proximity to the operative site, especially if you are asthmatic or predisposed to respiratory problems.

Connect the Mach 7/8 system only to a *properly grounded electrical outlet*.

If the unit is dropped, check it carefully before use.

Safety Labels

	Alternating current
	Ground
	Attention, refer to accompanying manual
	Power Off
	Power On
	Type B equipment (defines the degree of protection against electrical shock)
	12 VDC
	Air In
	Footswitch
	Remote

Cautions

The handpiece should be *directed precisely at the surfaces and tooth structures* that are to be modified or removed. The nozzle tip should be placed a few millimeters from the tooth and angled toward the area to be removed or modified.

Do not attempt to service the unit beyond those items described on page 6, *Maintenance*. Call an authorized Welch Allyn / Kreativ service representative for instructions.

Practice on extracted teeth prior to using the Mach 7/8 on patients. Begin with the 27.5 micron aluminum oxide powder. Use only short bursts, carefully monitoring your progress. Most users prefer the 27.5 micron powder at a Particle Energy setting of 50-80 PSI.

Do not substitute non-Welch Allyn / Kreativ materials or accessories. Use of materials or accessories supplied by other manufacturers may result in damage to the unit and will void the factory warranty.

Use only clean, dry air. Make sure that your air compressor system uses fully operational air dryer filter systems. Any moisture or oil in the air supply will adversely affect the performance of the Mach 7/8.

Check to be sure that your air system produces the *minimum pressure and flow rate* indicated in the Air section of the Specifications (page 10).

Sound clinical judgment, common sense and proper training are essential to the successful use of this unit to provide safe and efficient patient care.

Always use the *lowest possible pressure settings* sufficient to perform the current dental technique the system is being used for.

Always *place the handpiece back in its holder* when not in use to place the unit in Standby mode.

When the handpiece is removed for sterilization, the *handpiece extension* must be placed in its holder to place the unit in Standby mode.

Compliance

The equipment has been tested and found to comply with the limits for a Class B, Group 1 device pursuant to EN60601-1-2. This equipment generates radio frequency energy that may interfere with other equipment. If this equipment is suspected of interfering with other equipment, this can be verified by turning the equipment off and on. If this equipment is interfering with other equipment,

- Increase separation between the devices.
- Connect the devices to different AC outlets.
- Contact Welch/Allyn / Kreativ.

2. Contra-Indications and Indications

Contra-Indications

- Severe dust allergy, Asthma, or Chronic pulmonary disease
- Recent extraction or oral surgery
- Any lesion, sore, or open wound
- Sutures in the mouth
- Recent periodontal surgery
- Advanced periodontal disease with a compromised periodontal attachment
- Recent placement of orthodontic appliances with resulting oral abrasions
- Subgingival caries removal
- Any condition that would place the patient in greater risk of emphysema by using compressed air in the mouth

Indications

Intra-Oral

- Prepare teeth for Class I, II, III, IV, V and tunnel restorations
- Prepare teeth for veneer/facing restorations
- Prepare teeth for pit and fissure sealants
- Partial removal of composite restorations and repair at failure sites
- Etch metal, porcelain, and composite restorations prior to repairing them
- Removal of composite, amalgam or porcelain restorations
- Remove residual stains from enamel and dentin
- Removal of stain and calculus from teeth

Extra-Oral

- Clean cement from displaced crowns prior to recementation
- Clean restorations prior to recementation
- Etch internal surfaces of restorations
- Etch stainless steel crowns
- Carve occlusal anatomy in porcelain restorations prior to cementation
- Satinize metallic restorations to locate interference prior to cementation
- Repair prosthetic appliances

3. System Overview

The Welch Allyn / Kreativ Mach 7/8 Air Abrasion system is designed to remove tooth structure and other materials to prepare teeth for restoration, and as an adjunct to a high speed dental handpiece and bur. The system delivers a controlled mixture of abrasive particles in a dry air stream through the handpiece nozzle.

This manual should be thoroughly reviewed before installing and/or using the equipment. Please call Welch Allyn / Kreativ or their representative if you need additional information regarding installation, operation, or service of the instrument.

The Mach 7/8 system is designed for use only by and on the order of a dentist.

Mach 7 Main Controls

(See page 5 for Mach 8 control differences)

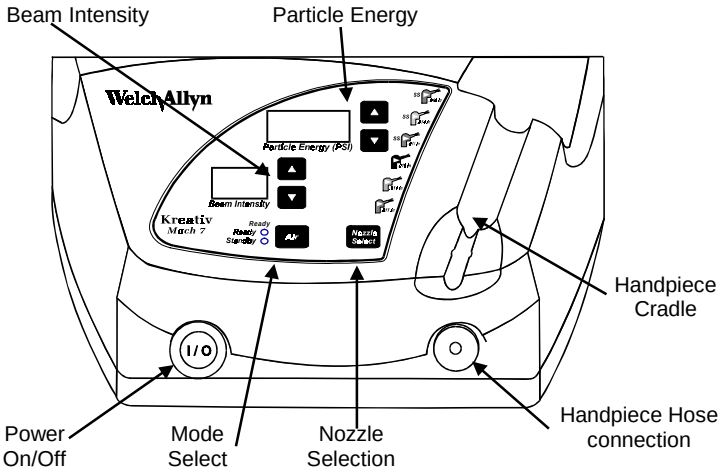


Figure 1: Mach 7 Controls

Power	Turn power on or off
Air Control	Select Ready or Standby mode to pressurize or depressurize the system
Beam Intensity	The amount of abrasive powder delivered to the handpiece nozzle. Range: 1 to 10.
Particle Energy	The pressure at which the abrasive powder is delivered. Range: 40-120 PSI (275-825 kPa).
Nozzle Selection	Press to select a nozzle: Standard handpiece (Gray, Green, or Blue), or Super Sonic handpiece (Red, Gold, or Violet).
Low Powder Indicator	Low powder level will cause an error to display on the Beam Intensity and Particle Energy LEDs. The unit will continue to operate. See the Error Code definitions on page 8.
Low Air Indicator	If the Input pressure is insufficient to keep the pinch valve closed or the system is unable to reach selected pressure, the unit alarm will beep and an error will appear on the Beam Intensity and Particle Energy LEDs. See the Error Code definitions on page 8.

4. System Unpacking, Setup, and Check-out

Mach 7/8 Rear Panel connections

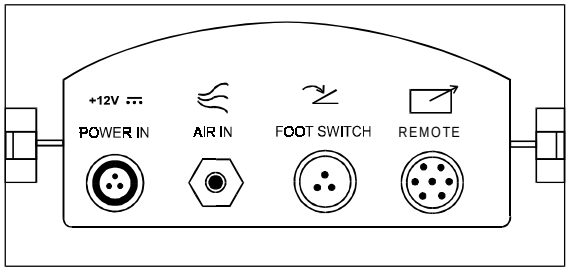


Figure 2: Mach 7/8 Rear Panel Connections

WARNING: Some residual powder may remain in the unit after factory testing. Always use protective eyewear when using the Mach 7/8 Air Abrasion system, and do not direct the nozzle towards the face when operating the footswitch.

CAUTION: Many air and water connectors look alike. Do not connect your instrument to water. Connecting the instrument's air input supply line to a water outlet will damage the instrument. Repairs for such damage are not covered under the limited warranty.

1. Open the Mach 7/8 cover.
2. Open the powder chamber, remove desiccant pack from inside of chamber and fill it with powder (see *Filling the Powder Chamber*).
3. Close the powder chamber and Mach 7/8 covers.
4. Connect the footswitch to the rear panel of the unit.
5. Connect the delivery hose between the handpiece nozzle assembly and the front of the Mach 7/8. Place the handpiece with extension in the cradle.

Note: When removing handpiece for sterilization, always return handpiece extension in the cradle.

6. Connect the air hose between the office air supply and the Mach 7/8. If you have a compressor, refer to the compressor User's Guide for information about use of Welch Allyn / Kreativ compressor air.
7. Connect the DC output of the external power supply to the back of the Mach 7/8 unit.
8. Connect the power supply cord between an external power supply and a properly grounded AC outlet.
9. If a remote control is provided with your unit, refer to your remote control User's Guide for connection.

Note: *A remote plugged into a Mach 7 will take control from the front panel. A remote plugged into a Mach 8 will function as a second operatory.*

Note: *A special footswitch "Y" adapter cable is required for the Mach 8 (see page 5).*

CAUTION: Do not exceed 135 PSI at input. Applying pressure in excess of 135 PSI will cause the relief valve to release any excess pressure.

Filling the Powder Chamber

WARNING: Press Air to select Standby mode *before* opening the lid and filling the powder chamber. The lid cannot be removed with the system pressurized (in Ready mode).

1. Set the Mach 7/8 Power Switch to OFF.
2. Open the lid of the Mach 7/8.
3. Remove the powder chamber lid by turning it counterclockwise.
4. Pour powder into the powder chamber to a level just below the metal filter. *Make sure that no lint, dirt, or other foreign substance enters the chamber.*
5. Close the powder bottle tightly to prevent moisture from entering the bottle.
6. Replace the powder chamber lid and hand tighten it.
7. Close the Mach 7/8 lid.

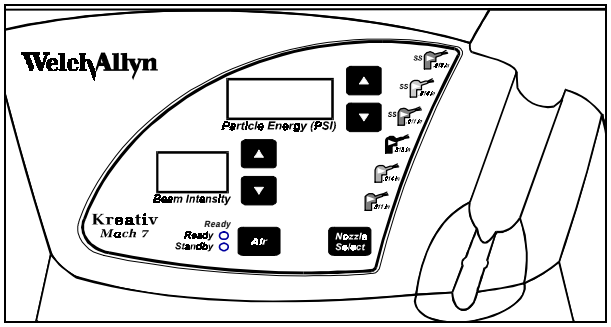
WARNING: Do not power up the system with the powder chamber open.

User Settings

You can change the Mach 7/8 factory settings for error code and pressure displays. Error codes can be displayed in English, numeric, or both. Particle energy can be displayed in PSI or kPa.

1. When the unit powers up, it will display a version code. Press and release the Nozzle Select button when this code is displayed.
2. Press the ▲▼ Beam Intensity keys to select a mode for error code display: 1 = English, 2 = Numeric, 3 = Alternating.
3. Press the ▲▼ Particle keys to select a mode for Particle Energy display: 1 = PSI, 2 = kPa.
4. Turn the system off and on to enter your changes.

5. Using the System



1. Turn the unit on. All of the lights on the Control Panel will flash and the yellow Standby indicator will turn on. When the lights stop flashing, the unit is in Standby mode. The values shown will be the settings from the last use.

   Note: Opening the lid of the unit will depressurize the system and power will turn off.

2. Press the ▲▼ keys to adjust the Particle Energy to provide optimum powder flow. This adjustment can be made in either Ready or Standby mode. A low Particle Energy setting (50-70) is suggested when first using the instrument.

3. Set the Beam Intensity (1-10) by pressing the Beam Intensity ▲▼ keys. The suggested beginning setting for Beam Intensity is 5.

4. Press Air to select the Ready mode.

5. Lift the handpiece from the cradle. If the handpiece was out of the cradle during power up, it must be replaced and then removed prior to pressing the footswitch. Failure to do so will result in an error.

   WARNING: Inspect the condition of the handpiece tip prior to each use.

   WARNING: Direct the initial powder sample into the high volume evacuation system prior to each patient use or when changing system settings.

6. Press the footswitch to start the powder flow through the nozzle.

Note: If the handpiece is out of the cradle during power up, it will need to be replaced and then removed prior to pressing the footswitch.

Unit Shutdown

1. Press Air to select Standby mode.

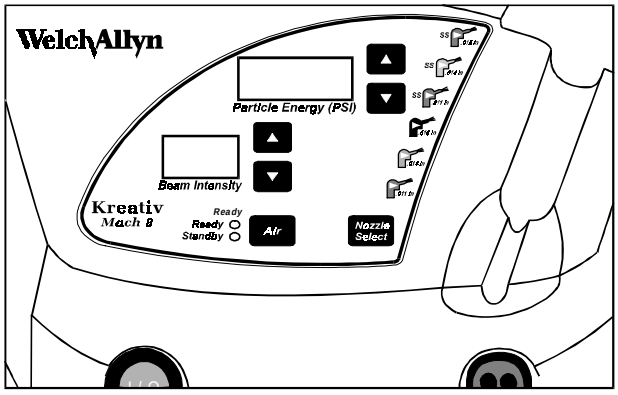
2. Set the Power Switch to OFF.

Note: If the handpiece is left out of the cradle and the unit is not used for 10 minutes, the unit will revert to Standby mode. When in Standby or when the handpiece is placed in the cradle, the footswitch is disabled. The unit will go to Standby when the handpiece is placed in the cradle.

6. Mach 8 Special Instructions

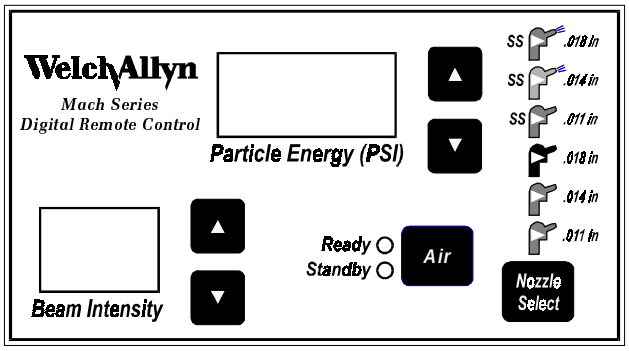
The Mach 8 is a multi-operatory version of the Mach 7. It is configured to use the main unit display as one operatory, with the display control module (included) operating from a remote site up to 16 feet away.

An optional second remote can be connected to provide dual remote functions with separations up to 32 feet. Contact your authorized Welch Allyn / Kreativ representative for these optional accessories.



The Mach 8 display panel and controls are the same as the Mach 7, except the Mach 8 has two handpiece hose connections. Before using the unit, verify that each hose works with its corresponding control panel and foot switch.

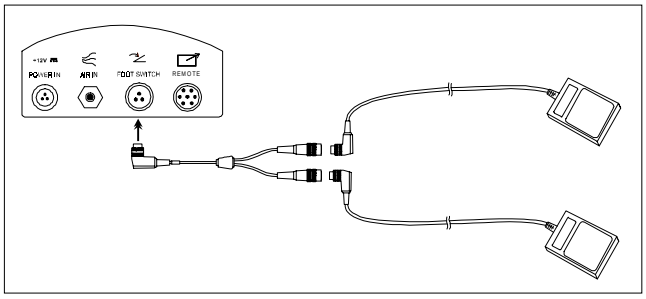
When a remote control module is plugged into the rear panel of the Mach 8, it functions as a second operatory.



- To activate one operatory at a time, remove the handpiece from the appropriate cradle.
- To deactivate or to allow the other operatory to function, place the handpiece back in the cradle.

Only one operatory can work at a time, and the inactive display panel will go blank.

Note: Always place the handpiece extension back in the cradle when the handpiece is removed from the hose assembly for sterilization. Failure to do so will lock out the other operatory, preventing it from being activated.



The foot switch “Y” adapter cable is required for second operatory use of the Mach 8. If a foot switch is plugged directly into the Mach 8 rear panel, it will only activate operatory one.

7. Routine Maintenance

Proper maintenance of the Mach 7/8 system is needed to maintain consistent cutting efficiency.

Note: There are no user-serviceable parts inside and all servicing (other than explicitly defined in the manual) shall be performed by the manufacturer or his authorized agent.

Cleaning Instructions

Case (outside)

Clean the case and control areas with a soft cloth slightly moistened with a mild detergent or isopropyl alcohol. Do not use any type of abrasive cleaners, scouring powder or solvents on the case.

Case (inside)

Excessive powder inside the equipment may be removed with a vacuum or a cloth, slightly moistened with water or isopropyl alcohol. Never use a moistened cloth on the Printed Circuit boards.

Powder Chamber

Clean the powder chamber, chamber lid, and gasket with a soft dry cloth. A soft bristle brush may also be used to remove excess powder.

Daily Requirements

Powder Chamber (perform daily or as required)

1. Open the powder chamber.
2. Observe the powder level and refill as necessary.

Powder Chamber Gasket (perform with powder fill up)

1. Every other time you refill powder, clean the lid gasket thoroughly before replacing the lid.
2. Thoroughly clean all mating surfaces.
3. Hand tighten the lid to avoid air leaks.
4. Inspect inside of unit for powder, clean up excess powder.

Weekly Requirements

Powder Chamber

1. Inspect the powder chamber for moisture.
2. Look for powder clumps or wet powder and discard and replace as necessary. To dry wet powder, place the powder to be used into a microwave-safe container. Microwave on high for 45 seconds to dry the powder prior to placing it in the chamber.

   Note: Be careful when removing the container from the microwave, as it may be hot.

Air Filter Elements

1. Examine the Silica Gel filter for change of color.
2. If the purple gel has become clear, replace the filter.
3. New filters are available from your authorized Welch Allyn / Kreativ service representative.
4. Examine the Paper Element (coalescing) filters for damage and wetness.
5. Replace as necessary. New filters are available from your authorized Welch Allyn / Kreativ service representative.

Pinch Tubes

1. There is one pinch tube inside the pinch valve assembly, located between the powder chamber and the front of the unit.
2. Remove the pinch tube by removing the two thumb screws and the black cover block.
3. Pull the pinch tube from the hose assembly.
4. Inspect the tube for signs of wear and replace with new tube as necessary.
5. Realign the pinch tube assembly with the grooves and securely tighten the thumb screws.

Monthly Requirements

Internal Tubing

1. Inspect internal tubing for wear and air leakage.
2. Listen for audible leaking sounds and look for powder accumulation internal to the unit.
3. Soapy water and a small paintbrush are ideal for finding small air leaks.
4. Clean up excess powder to help isolate the leak area.
5. If a leak is detected, try re-seating the tube into its fitting, or replace any damaged tubing.
6. If the leaking persists, please call your authorized Welch Allyn / Kreativ service representative.

Handpiece Nozzles

It is possible to have a worn nozzle without any visible signs. However, the system's performance will be affected.

1. Inspect all the handpiece nozzles for wear, paying close attention to the carbide insert at the end of the tip.
2. If there are any slits or chips, replace the nozzle.
3. A worn nozzle will greatly effect the performance of cutting and powder flow control.

8. Troubleshooting

Refer to the following table before you contact your Welch Allyn / Kreativ service representative.

Problem	Possible cause	Remedy
Error Code 35	Footswitch down on Power Up	Check switch
Error Code E-42-1 (Lo Pdr)	Low Powder	Add powder
Error Code E-42-2 (Lo Air)	Low input pressure	Check pressure
All other error codes	Call local service rep	Call local service rep
No Power	Power supply unplugged	Check plugs
	Main switch OFF	Check switch
	Main switch bad	Call local service rep.
	Blown circuit breaker in the Operatory	Check facility power box
	Lid is open	Close lid
No powder flow when footswitch is activated	Footswitch not plugged in	Check connection
	Particle Energy or nozzle not properly selected	Check LED displays
	Handpiece/nozzle clogged	Check for clog
	Handpiece inoperable, handpiece was not in cradle on power up	Replace and remove handpiece from cradle. If it still does not function properly, clean the LED sensor hole with a cotton swab.
	Tubing pinched	Check tubing
	Powder chamber empty	Refill powder chamber
	Air Valve problem	Call local service rep
	Clogged orifice in chamber	Disassemble and clean chamber
Powder flow from handpiece hose	Ruptured handpiece hose	Call local service rep
Air flow from nozzle when footswitch is not depressed	Loss of air pressure due to a misadjusted pinch valve regulator	Put system in Standby and call local service rep
	Faulty footswitch	Put system in Standby and call local service rep
	Defective pinch valve	Put system in Standby and call local service rep
	Pinch valve block is not tight	Put system in Standby and tighten thumb screws
Cutting rate is inaccurate	Pressure indicator is inaccurate or feed system drive failure	Call local service rep
Erratic powder flow	Powder caking in chamber	Replace powder
	Chamber empty	Check powder level
	Nozzle partially clogged	Check nozzle
	Moisture in air line	Check filters, replace powder and filter
	Blown pinch tube	Change pinch tubes
Powder spray loses definition	Worn nozzle tip	Replace nozzle
	Too much distance from cutting surface	Work closer
Excessive powder inside unit	Hole in tubing.	Replace tubing
	Hole in pinch tube	Replace pinch tube
Error beep when footswitch is pressed	Handpiece was not in cradle on power up	Put handpiece in cradle and remove
System fails to depressurize when switching to Standby mode	Inoperative valve	Disconnect air supply and call local service rep

If these instructions do not solve the problem, please contact Welch Allyn / Kreativ Technical Support at: (888) 579-1478 (US Only) or (858) 621-6611(Fax)

9. Warranty, Returns and Adjustments

Returns and Adjustments

Warranty claims must be made promptly and received by your nearest authorized Welch Allyn / Kreativ service representative during the warranty period. The liability of Welch Allyn / Kreativ, under valid warranty claims, is limited to repair or replacement at the purchaser's authorized Service Center or the purchaser's place of business, at the option of the authorized service representative. If it is necessary to return a product for repair or replacement, authorization for the return must first be obtained from the authorized service representative.

All products returned for examination or warranty repair must be sent insured via a means of transportation specified by the authorized service representative.

Welch Allyn / Kreativ, or its authorized service representative claims the sole responsibility for determining the cause of any instrument failure and the adjustments are subject to Kreativ approval.

Limited Warranty

Welch Allyn / Kreativ warrants the equipment to be free from defects in material and workmanship for a period of 12 months from the date of shipment. Damage due to failure of the customer to perform the required user/preventive maintenance is not warranted. Certain components having limited life expectancy (pinch tubes, air/abrasive tubing, hand pieces and handpiece tips) are not warranted against normal wear and tear or customer damage. This limited warranty applies only to the original purchaser / user of the equipment.

The foregoing limited warranty is exclusive and in lieu of all other warranties, whether written, oral, or implied, and shall be purchaser's sole remedy and Welch Allyn / Kreativ's sole liability under contract or warranty or otherwise for the product.

Welch Allyn / Kreativ **disclaims** any implied warranty of merchantability or fitness for particular purposes. In no event shall Welch Allyn / Kreativ be liable for any incidental or consequential damages, or for any incidental or consequential damages arising out of, or in connection with, the use or performance of the product delivered hereunder.

Storage and Shipment

The Welch Allyn / Kreativ Air Abrasion dental instruments have been designed for long term usage in normal dental office environments. If it is to be stored for any reason for a long period, it should be covered to protect it from adverse conditions. The area it is to be stored in should meet the Environmental Limitations Transport and Storage Requirements indicated in the Specifications section (page 10).

The unit has been designed for shipment by normal commercial carriers. Protective packaging should be used, and the original packing materials should be reinstalled for shipment. Shipping instructions must be followed closely. The purchaser will be responsible for damage resulting from improper packing.

10. Specifications

Power	100-240 V~, 50 / 60 Hz, 0.75A - 0.35A using external DC power supply delivered with unit.
Air	80 psi to 130 psi (550 kPa to 896 kPa) with at least 1.2 cfm (34 l/min) recommended
Size	10” x 15” x 10” (25cm x 38cm x 25cm)
Weight	12 lbs. (5.5 kg)
Environment	
Operational	Temp: 50°F (+10°C) to 104°F (+40°C)
	Relative humidity: 30% to 75%
	Pressure: 10.15 psi (70 kPa) to 15.3 psi (106 kPa)
Transport and Storage	Temp: -40°F (-40°C) to 158°F (+70°C)
	Relative humidity: 10% to 90%
	Pressure: 7.25 psi (50 kPa) to 15.3 psi (106 kPa)
Equipment Classification	Class I (requires an electrical earth ground) and ordinary protection against ingress of water Applied Part: Type B Mode of Operation: Continuous Operation
Particle Energy Accuracy	The Particle Energy (PSI) display is an internal pressure measurement and should not be interpreted as the precise pressure at the handpiece nozzle.
Electrical Fuses	There are no customer serviceable fuses.
Options	A wide selection of abrasive powders and nozzle tip angles and sizes are available from Welch Allyn / Kreativ.

11. Recycling

All recycling must be in compliance with relevant national laws. Government authorized recycling centers must be used. There are no hazardous materials in this product.

Device

- All covers and housings should be recycled (steel or aluminum).
- Plastic parts should be removed from the metal pads before recycling (e.g., power inlet, footswitch connector, main switch, etc.)
- All printed circuit boards should be recycled as electronic devices.

Accessories

- All spare parts should be recycled as listed above.
- Parts that have been in contact with the patient should be cleaned and sterilized.

Packaging

The carton, all other plastics, and inserts should be recycled (cardboard, foam, polyethylene).

Environmentally Relevant Materials

Components	Materials
Enclosure, all brackets	Steel, Aluminum, ABS
Printed Circuit Boards	Epoxy, FR4

SAVE THE CARTON! The Mach 7/8 and all accessories are shipped in a single container. The shipping container and packing materials should be retained in the event that the instrument has to be returned for service or repair.

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